HAND REHABILITATION

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PROTOCOL FOR EXAMINATION

START BY

SHOULDER EXAMINATION THEN ELBOW , WRIST(1

HAND START BY: JOINTS(ACTIVE, PASSIVE)(2

TENDONS (FDS, FDP, EXTENSORS) -

NERVES (MEDIAN, ULNAR , RADIAL) -

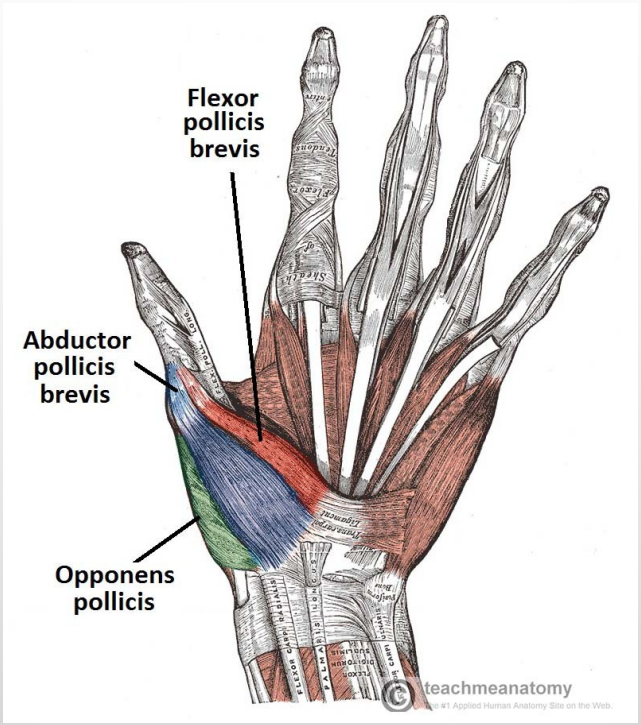
START BY FREE OR NORMAL FINGER (3

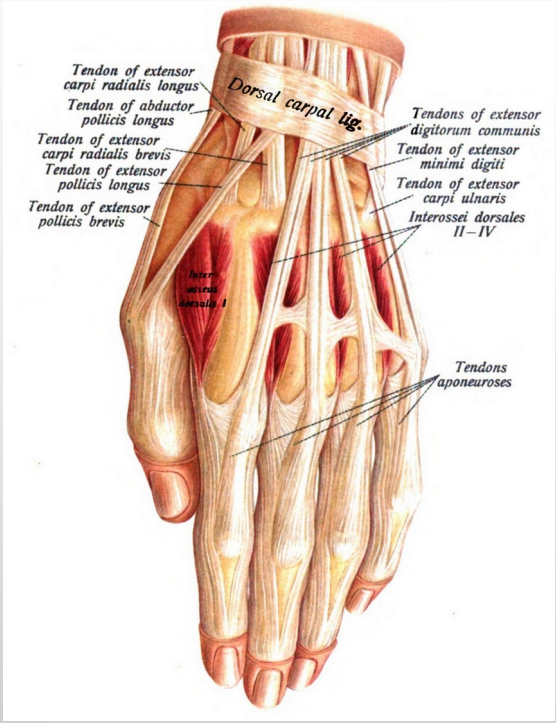
TIPS

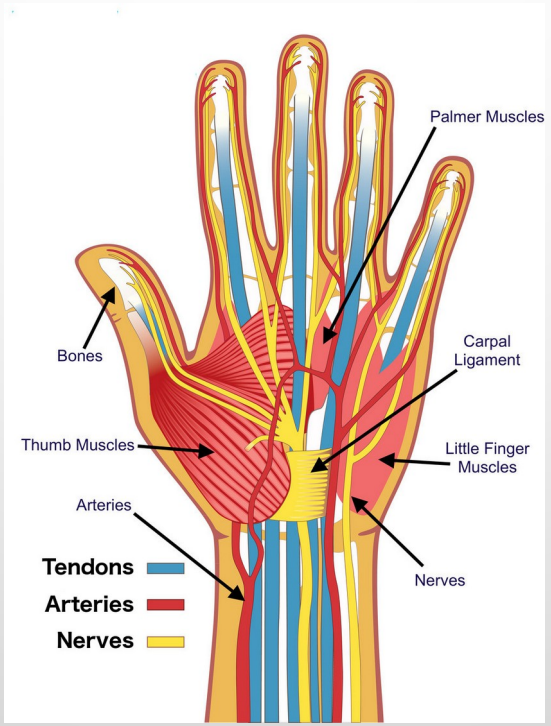
- DON’T BE AFRAID
  - متخافش من العيان ولا من العياط و لا الوجع
  - اوعي تمشي العيان
  - لو في كسر اشتغل علي الباقي
  - مفيش عمليات علي مفصل لا يتحرك
- NO OPERATION ON STIFF JOINT
  - ابداء من المكان السليم
  - لازم تبدا اول زياره علشان يطمئن و الوجع يوقف
- START EARLY TO IMPROVE EDEMA THEN STIFFNESS THEN PAIN

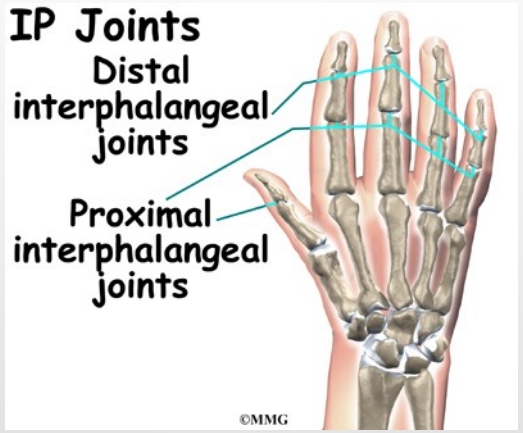
TIPS

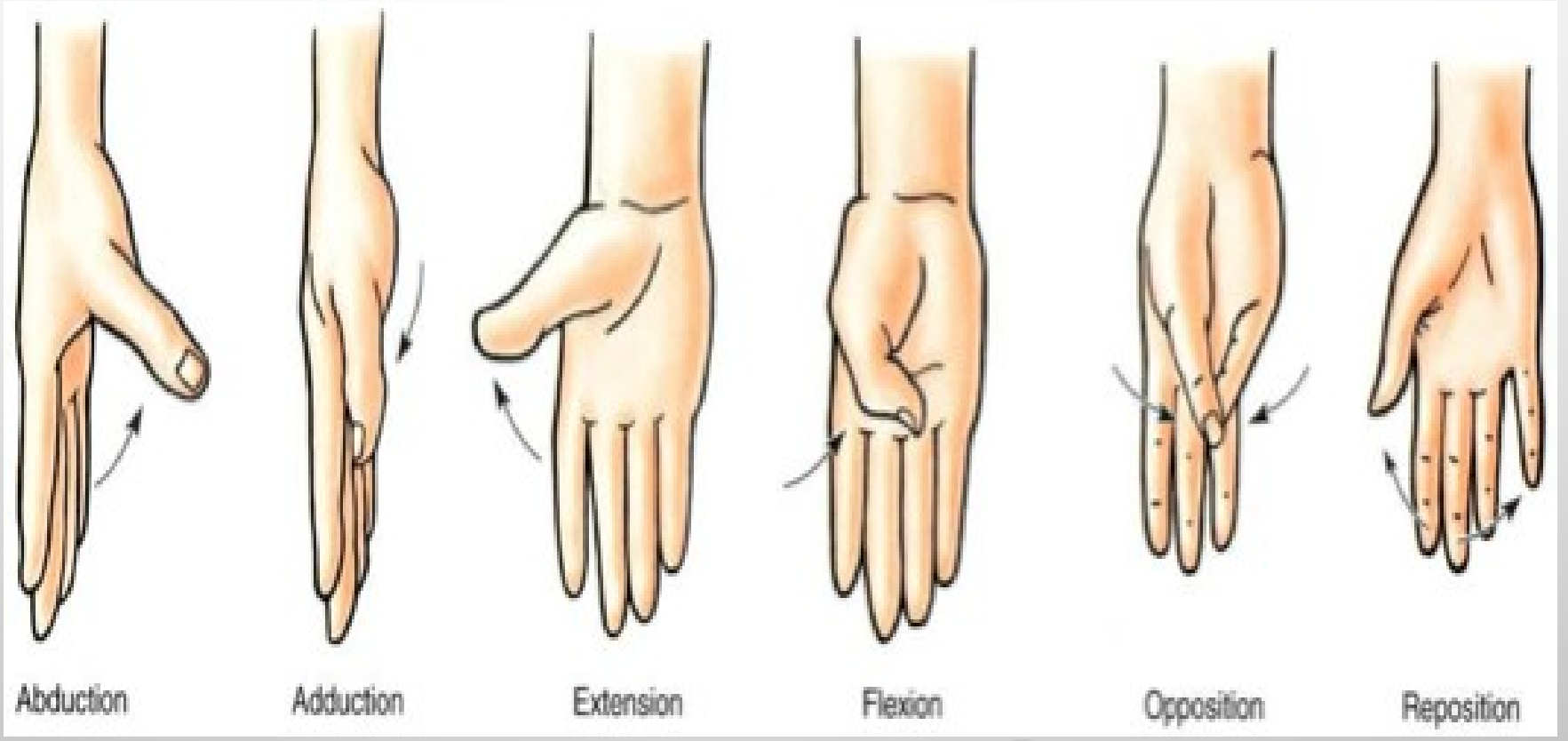
- I NEED THE FUNCTION
- عاوز ايه؟؟

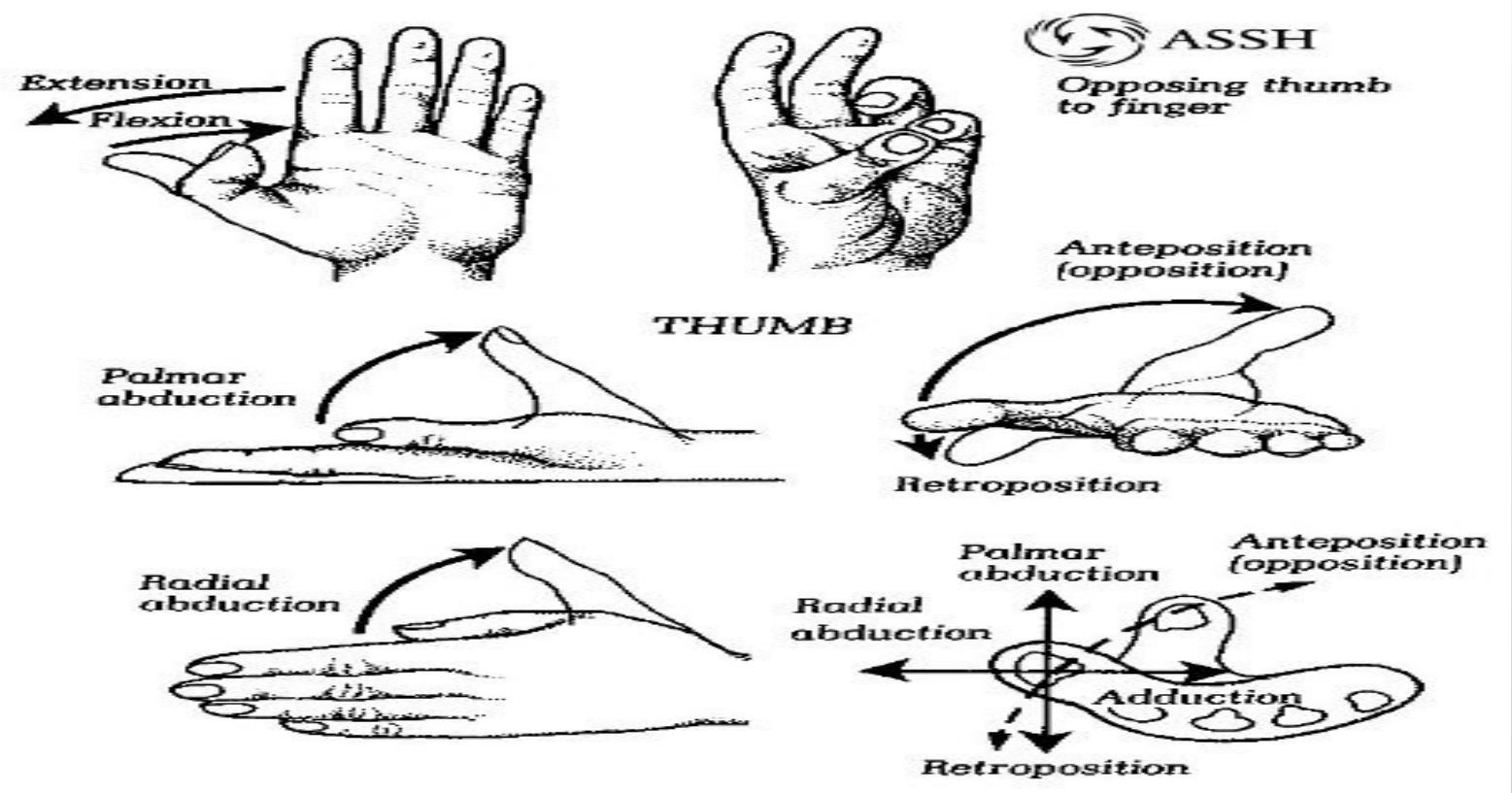

Flexor pollicis brevis
Abductor pollicis brevis
Opponens pollicis
teachmeanatomy

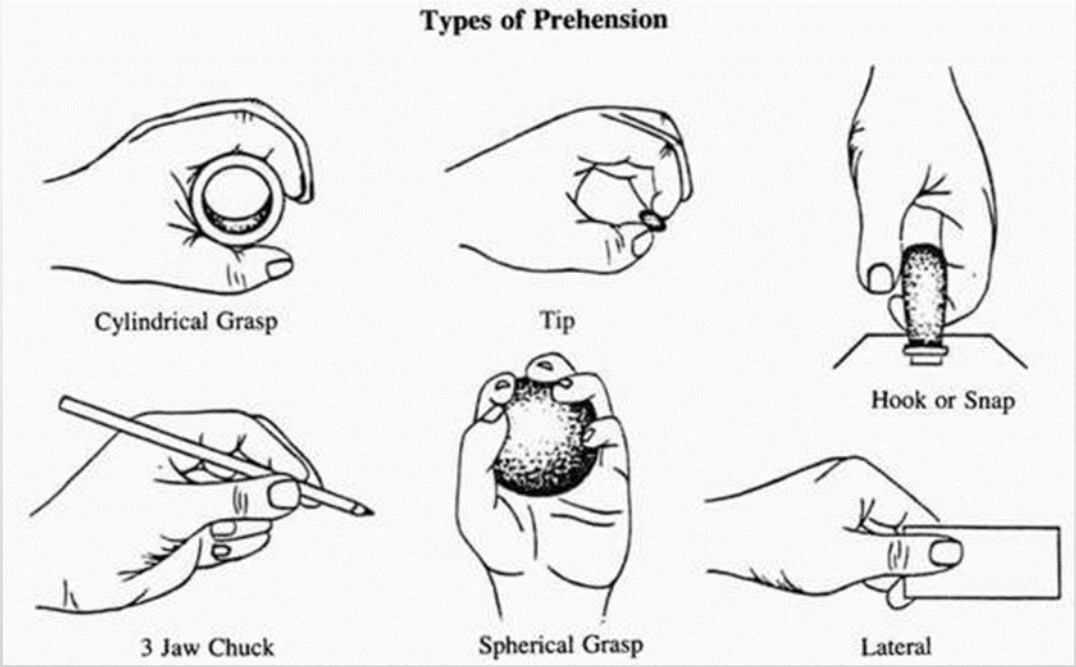

Tendon of extensor carpi radialis longus
Tendon of abductor pollicis longus
Tendon of extensor carpi radialis brevis
Tendon of extensor pollicis longus
Tendon of extensor pollicis brevis
Dorsal carpal lig.
Tendons of extensor digitorum communis
Tendon of extensor minimi digiti
Tendon of extensor carpi ulnaris
Interossei dorsales II–IV
Tendons aponeuroses


Palmer Muscles
Bones
Carpal Ligament
Thumb Muscles
Little Finger Muscles
Arteries
Nerves
Tendons
Arteries
Nerves


IP Joints
Distal interphalangeal joints
Proximal interphalangeal joints
©MMG


Abduction
Adduction
Extension
Flexion
Opposition
Reposition


Extension
Flexion
ASSH
Opposing thumb to finger
Anteposition (opposition)
THUMB
Palmar abduction
Retroposition
Radial abduction
Palmar abduction
Anteposition (opposition)
Radial abduction
Adduction
Retroposition


Types of Prehension
Cylindrical Grasp
Tip
Hook or Snap
3 Jaw Chuck
Spherical Grasp
Lateral

Types of grips of the hand

Power grip

Hook grip

Chuck grip

Pinch grip /precision grip

Types of Prehension

- Power grip
  - Spherical
  - Cylindrical
- Precision grip
- Power (key) pinch
  - Lateral pinch
- Precision pinch
- Hook grip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START

THUMB MOVEMENT

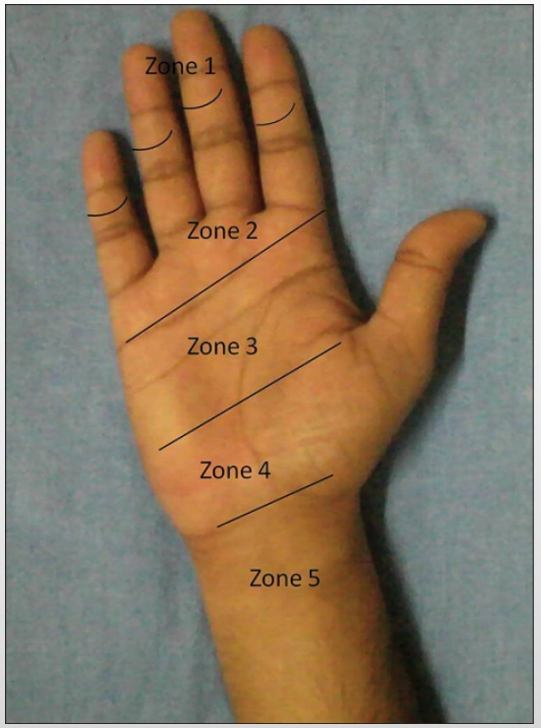
HAS 3 JOINTS CMC JOINT, MCP JOINT, IP JOINT •

CMC INVOLVED WITH OPPOSITION OF THUMB

MCP FLEXION,EXTENSION

:MOVMENT OF THUMB

FLEXOR TENDON INJURY ZONE



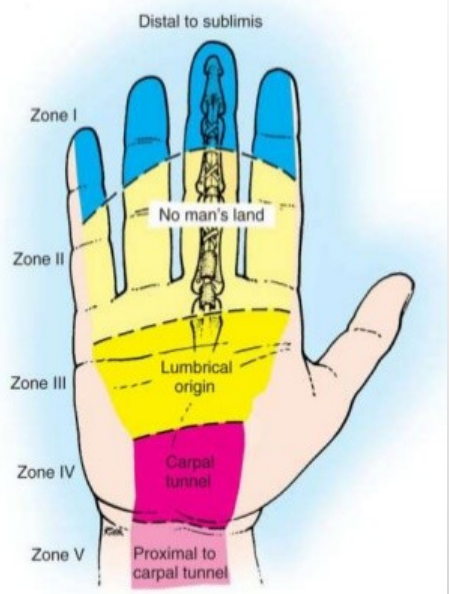
Phases of Tendon Healing

Phase	*Days*	*Histology*	*Strength*
Inflammatory	0-5	cellular proliferation	none
Fibroblastic	5-28	fibroblastic proliferation with disorganized collagen	increasing
Remodeling	>28	linear collagen organization	will tolerate controlled active motion

one	Definition	Introduction	Treatment
I	Distal to FDS insertion	Jersey finger	
II	FDS insertion to distal palmar crease	Zone is unique in that FDP and FDS in same tendon sheath (both injured within the flexor retinaculum)	Direct repair of both tendons followed by early ROM (Duran, Kleinert). Be sure to preserve A2 and A4 pulley. This zone historically had very poor results but results have improved due to advances in postoperative motion protocols
III	Palm	Often associated with neurovascular injury which carries a worse prognosis	Direct tendon repair. Good results from direct repair can be expected due to absence of retinacular structures (if no neurovascular injury)
IV	Carpal tunnel	Often complicated by postoperative adhesions due to close quarters and synovial sheath of the carpal tunnel	Direct tendon repair. Transverse carpal ligament should be repaired in a lengthened fashion
V	Wrist to forearm	Often associated with neurovascular injury which carries a worse prognosis	Direct tendon repair
Thumb	TI, TII, TIII	Outcomes different than fingers. Early motion protocols do not improve long-term results and there is a higher re-rupture rate than flexor tendon repair in fingers	Direct end-to-end repair of FPL is advocated. Try to avoid Zone III to avoid injury to the recurrent motor branch of the median nerve. Oblique pulley is more important than the A1 pulley; however both may be incised if necessary. Attempt to leave one pulley intact to prevent bowstringing

Flexor Tendon Injury Zones

1: flexor digitorum profundus distal to insertion of flexor digitorum superficialis
2: insertion of flexor digitorum superficialis to proximal edge of A1 pulley (“No Man’s Land”)
3: proximal edge of the A1 pulley to distal edge of carpal tunnel
4: within the carpal tunnel
5: proximal to the carpal tunnel



FLEXOR TENDON REHABILITATION

- PASSIVE IMMOBILIZATION-1
- EARLY PASSIVE MOBILIZATION-2
- EARLY ACTIVE MOBILIZATION-3

EARLY ACTIVE MOBILIZATION

ALL THE PATIENTS WERE SPLINTED IN DORSAL BLOCKING SPLINT WITH • WRIST IN 20-DEGREE FLEXION, MCP JOINT IN 70-DEGREE FLEXION AND INTERPHALANGEAL JOINTS (IP) IN FULL EXTENSION (WITH MODIFICATION IF DIGITAL NERVE INJURIED). REHABILITATION PROGRAM START WITHIN THE FIRST 3 DAYS AFTER TENDON REPAIR UNDER SUPERVISION OF HAND .REHABILITATION CONSULTANT

THE PROGRAM WILL PASS THROUGH 4 PHASES. THE CRITERIA FOR • ADVANCEMENT FROM ONE STAGE TO ANOTHER WILL DEPEND ON FLEXION LAG IF IT IS ABSENT WE CAN PROLONG THE PHASE, BUT IF RESPONSIVE OR UNRESPONSIVE WE MUST PROGRESS TO NEXT PHASE(CONTINUING TO INCREASE LOAD TO TENDON UNTIL LAG BECOMES RESPONSIVE). SCAR AND .EDEMA MANAGEMENT ALL THROUGH PHASES

:PHASE I (FIRST DAY TO 3-4 WEEKS)

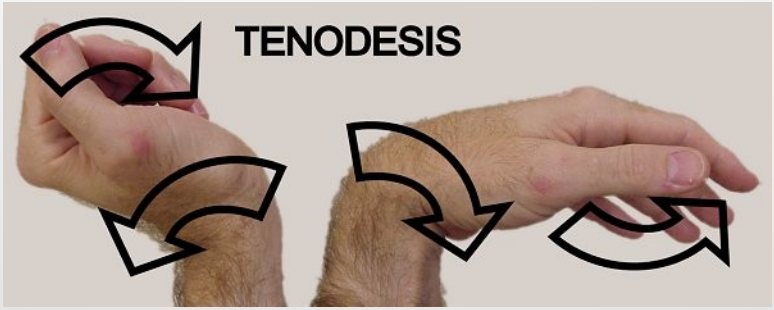
- WILL BEGIN WITH PASSIVE PIP/DIP FLEXION IN SPLINT FOLLOWED BY ACTIVE EXTENSION TO ROOK OF SPLINT, THEN COMPOSITE PASSIVE FLEXION .FOLLOWED BY ACTIVE EXTENSION TO ROOK OF SPLINT
- WITH PLACE AND HOLD MOBILIZATION AND STRAIGHT FIST TENODISIS. THEN .ACTIVE DIGITAL EXTENSION WITH WRIST FLEXED
- FOR UNINVOLVED DIGITS AND TENDONS FDS, FDP BLOCKING EXERCISES. .(REPATATION: 10 TIMES EACH, EVERY 2 HOURS)

There are three ways of making a fist:

Straight Hook fist Straight fist Full fist

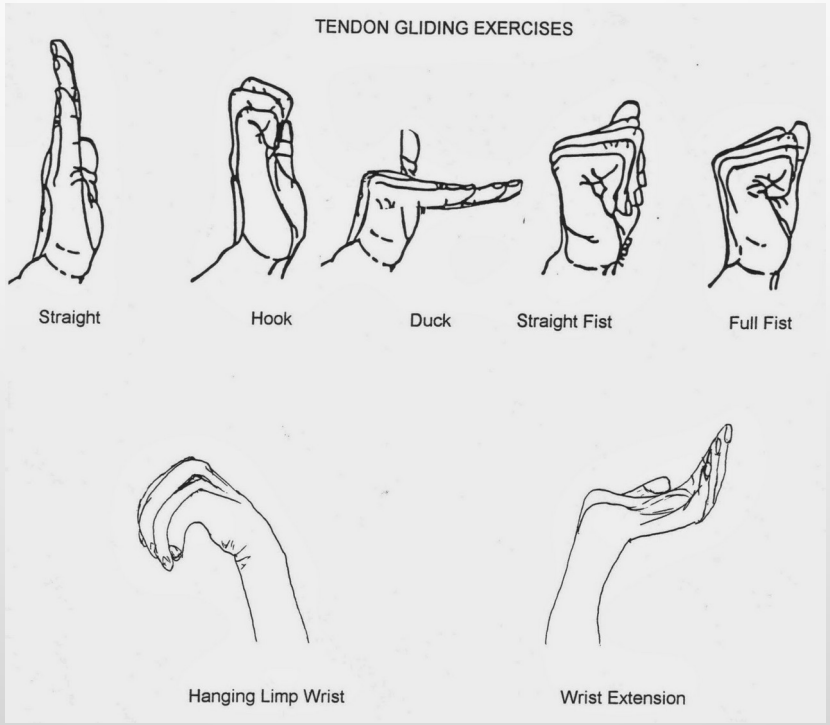
:PHASE II (3-6WEEKS)

CONTINUE AS PHASE I WITH ADDITION OF PLACE AND HOLD HOOK FIST • TENODESIS, PROGRESS TO ACTIVE TENODESIS FOR COMPOSITE, STRAIGHT, AND HOOK FISTS THEN TABLETOP INCREASE REPETITION OF EXERCISES .REDUCE FREQUENCY OF SESSIONS AT HOME TO 3 TIMES PER DAY


TENODESIS

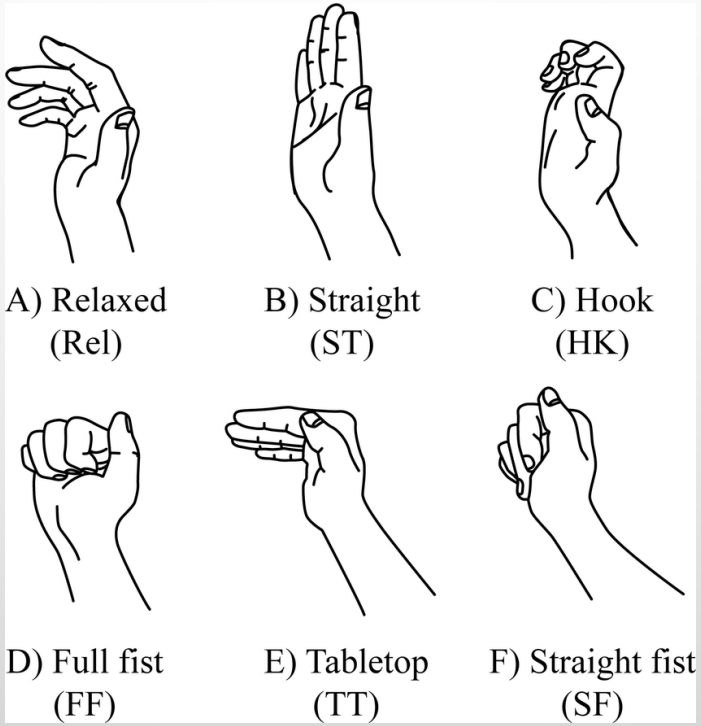
:POSTOPERATIVE PHASE III (6-8 WEEKS)

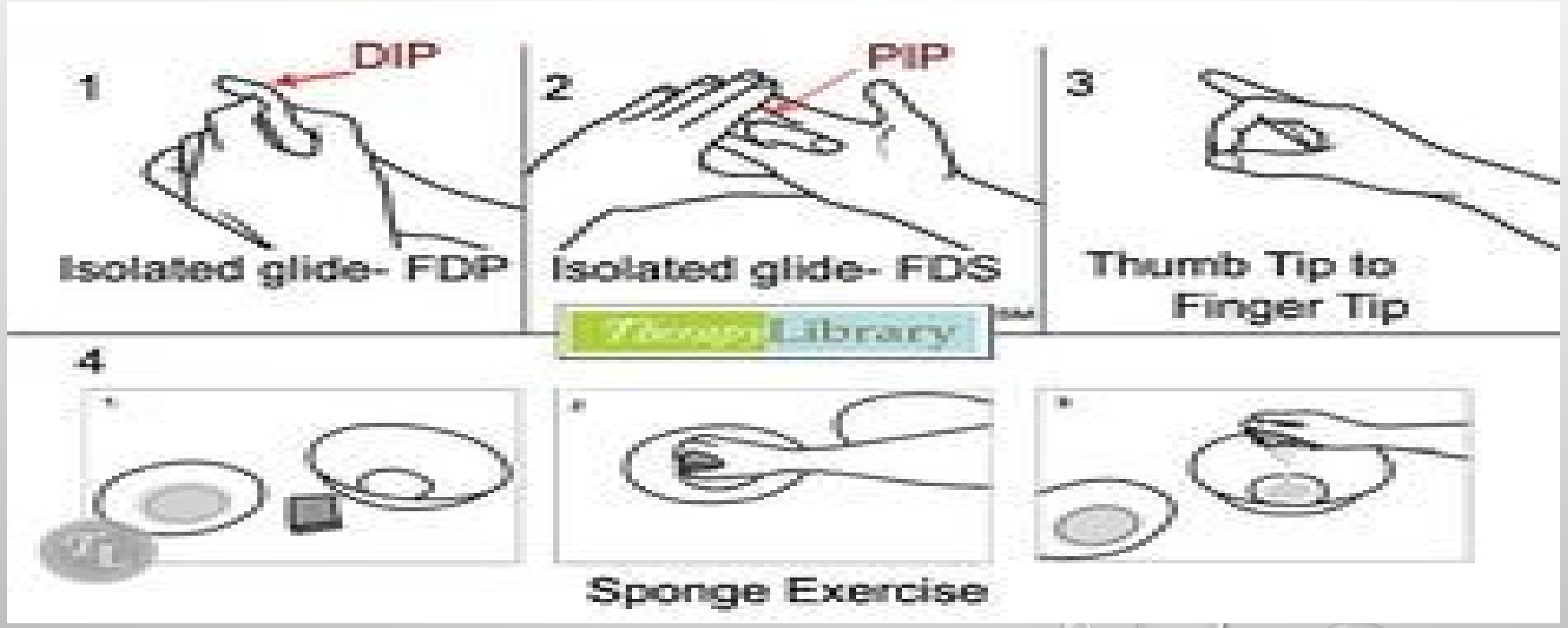
- .DISCONTINUE DORSAL BLOCK SPLINT, MAY NEED EXTENSION ONES
- ACTIVE TENODESIS PROGRESSED TOWARD ACTIVE TENDON GLIDES. ISOLATED FDS AND FDP GLIDE OF REPAIRED TENDON. GENTLE BLOCKING .FDS AND FDP AT 6 WEEKS, IF UNRESPONSIVE FLEXION LAG
- ALSO, FUNCTIONAL ACTIVITIES, RESISTANCE EXERCISES WITH ISOMETRIC .PINCH AND GRIP


TENDON GLIDING EXERCISES
Straight
Hook
Duck
Straight Fist
Full Fist
Hanging Limp Wrist
Wrist Extension

: POSTOPERATIVE PHASE IV (8-16 WEEKS)

FULL ACTIVE MOTION, INDEPENDENCE WITH SELF-CARE, HOMEMAKING, • WORK, SCHOOL, LEISURE. FULL PARTICIPATION IN ADL BY 12 WEEKS. GRIP AND PINCH STRENGTHENING ,BLOCKING EXERCISES, PROGRESS TO FULL USE OF INVOLVED HAND IN ALL ADL


A) Relaxed
(Rel)
B) Straight
(ST)
C) Hook
(HK)
D) Full fist
(FF)
E) Tabletop
(TT)
F) Straight fist
(SF)


1
DIP
Isolated glide- FDP
2
PIP
Isolated glide- FDS
3
Thumb Tip to
Finger Tip
Therapy Library
4
Sponge Exercise

ZONE 3

- : LUMBRICAL INJURY
- :POSITION OF LUMBRICALPLUS
- MCP FLEXION AND IP EXTENSION CAN LEAD TO ADHESIONS
- HOOK FIST TO PREVENT ADHESIONS
- 9MCP

ZONE 2

:HAS PULLEY SYSTEM HAS TO BE REPAIRED •

INJURY LEADS TO BOWSTRINGING •

NO MANS LAND •

•

CONTRAINDICATIONS

- DEFECTIVE REPAIR
- YOUNG AGE
- MULTIPLE INJURIES

EXTENSOR TENDON INJURY

EXTENSOR TENDON REHABILITATION

THE THREE MOST COMMON POSTOPERATIVE TREATMENTS ARE •

IMMOBILISATION (1 •

EARLY CONTROLLED MOBILISATION(2 •

.EARLY ACTIVE MOBILISATION(3 •

IMMOBILIZATION .1

- :DURING THE FIRST THREE WEEKS
- THE WRIST IS SPLINTED IN AT LEAST 21°-45° EXTENSION WITH THE MCP JOINTS AT 0°-20° FLEXION AND THE IP JOINTS IN NEUTRAL POSITION
- THIS PERIOD OF IMMOBILIZATION IS FOLLOWED BY PASSIVE AND ACTIVE MOVEMENT OF THE AFFECTED ZONES

EARLY CONTROLLED MOBILIZATION .2

A DYNAMIC SPLINT IS USED, SO THAT THE PASSIVE MOTION IS CAUSED BY • THE RESISTANCE OF THE ELASTIC BANDS. MOREOVER, CONTROLLED PASSIVE .EXERCISES SHOULD BE DONE

BENEFITS: SUPPORT OF THE PASSIVE GLIDE OF THE REPAIRED TENDON + • PROTECTION AGAINST EXCESSIVE LOAD
DISADVANTAGES: UNPLEASANT TO WEAR + EXPENSIVE TO CONSTRUCT[10]

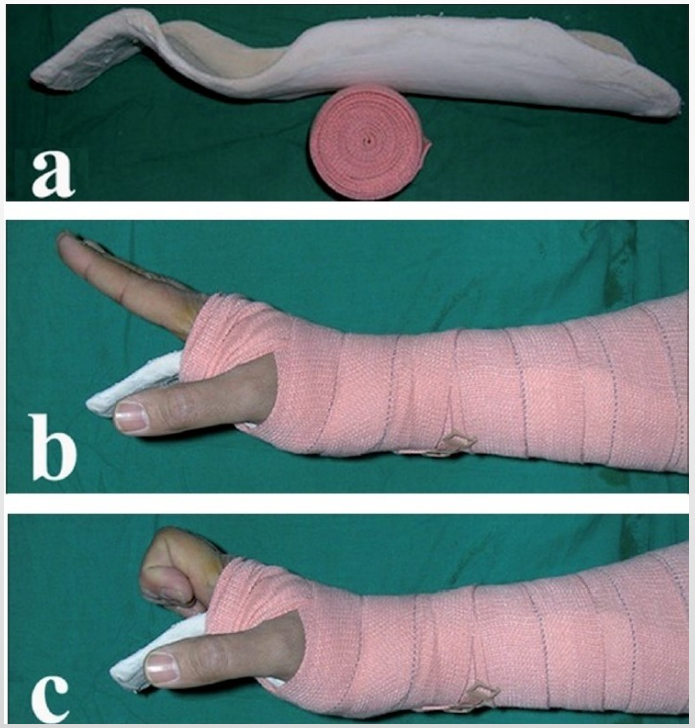
EARLY ACTIVE MOBILIZATION.3

- THE PATIENT WEARS A STATIC SPLINT AND IN THE MEAN TIME, ACTIVE EXERCISES, SUCH AS BENDING AND EXTENDING THE JOINTS SHOULD BE .DONE
- BENEFITS: STIMULATION OF THE GLIDING + DECREASING OF THE RISK OF ADHESIONS[1]

ACTIVE MOBILIZATION
ZONE III,IV

- :FIRST DAY TO 4 WEEKS
- SPLINT OVER THE VOLAR SIDE OF THE LIMB WITH WRIST IN 45° OF DORSIFLEXION AND MP JOINTS FLEXED AT LEAST 50° .
- .IN CASE OF THUMB INJURIES IP JOINT ACTIVELY FLEXED TO ABOUT 60°
- EXERCISE FOUR TIMES IN ONE SESSION AND FOUR SESSIONS EACH DAY
- : THE PATIENT WAS INSTRUCTED TO CARRY OUT TWO EXERCISES ACTIVELY
- COMBINED IP AND MP JOINTS EXTENSION (1)
- JOINT EXTENSION WITH IP JOINT FLEXION(2)

EXTENSOR REHABILITATION



EXTENSOR REHABILITATION

EXTENSOR REHABILITATION

WEEKS 4-6

- GENTLE FLEXION OF MP JOINTS AND IP JOINTS STEADILY INCREASING TO FULL FLEXION AND POWER GRIP. .THIS FIST-MAKING WAS DONE WITH UNLIMITED FREQUENCY DURING THE DAY
- .AT SIX WEEKS THE SPLINT WAS COMPLETELY REMOVED
- AND EXTENSOR STRENGTHENING EXERCISES WERE ADVISED, LIKE FLEXION OF IP JOINTS AND ACTIVE EXTENSION AND FLEXION AT MP JOINTS WITH WRIST NEUTRAL TO IMPROVE THE EXCURSION OF REPAIRED .EXTENSOR TENDON
- THIS WAS DONE WITH UNLIMITED FREQUENCY. PATIENTS WERE ADVISED FOR FACILITATED GESTURES REQUIRING FULL EXTENSION OF THE DIGITS E.G
- IF THE SCAR WAS FOUND ADHERENT IT WAS MOBILIZED WITH LMASSAGE THREE TIMES A DAY. THE PATIENTS .WERE ENCOURAGED TO DO THEIR ACTIVITIES OF DAILY LIVING WITH THE INJURED HAND
- INITATE TABLE TOP, OTHER TENDON GLIDES

LIMITATIONS

- NOT FOR ZONE I OR II(COMPLETE IMMOBILIZATION UP TO 6 WEEKS)
- STRONG REPAIR AND GOOD TENDON QUALITY
- EARLY DAY 1 TO 3
- BEGAN BY PASSIVE WRIST TENODISIS
- ADVANCMENT ACC. TO EXTENSION LAG(DIFFERENCE BETWEEN ACTIVE AND PASSIVE EXTENSION)
- CONCENTRATE ON EXTENSION EX. NOT FLEXION
- START MOVEMENT GRADUALLY IF FLEXION OR EXTENSION FOR PIP, DIP INCREASE DEGREE EVERY WEEK

ZONE V,VI

- :(WEEKS 1-3)
- CAST WRIST 40 EXTENSION ,MP 20-30FLEXION
- START PASSIVE TENODESIS GRADUALLY(WRIST FLEXION 20, MP EXTENSION OR PASSIVE(1 WRIST EXTENSION WITH MP FLEXION TO 40
- ACTIVE PLACE AND HOLD WITH IP,MP EXTENSION, WRIST 20 FLEXION.(IF WRIST(2 EXTENSORS AFFECTED KEEP WRIST EXTENSION 20,MP,IP EXTENDED AND HOLD
- PROTECTED ACTIVE MP EXTENSION WRIST 20 FLEXION , MP 30 FLEXION THEN ACTIVE(3 .EXTENSION TO 0(IF WRIST EXTENSORS AFFECTED WRIST 20 EXTENSION
- ACTIVE HOOK FIST(4
- : AFTER 3 WEEKS
- PASSIVE TENODESIS (1
- CONTINUE PROTECTED ACTIVE EXT.WITH INCREASE ARC 10-20(2
- INCREASE MP EXTENSION GRADUALLY(3

:WEEKS 4 •

ACTIVE TENODESIS(1 •

TENDON GLIDING WITH EXTENDED WRIST(2 •

:WEEKS 5 •

PASSIVE FLEX FINGER AND WRIST •

:6WEEKS •

COMPOSITE FLEXION •

STRENGTHENING WRIST •

THUMB LESION

- ZONE I,II: NO MOBILIZATION
- :ZONE III,IV: CONTROLLED PASSIVE MOTION
- PASSIVE TENODESIS WITH RELEAXED THUMB, PASSIVE MP FLEXION,EXTENSION
- :ZONE V:EARLY ACTIVE MOBILIZATION
- :TO 3 WEEKS 0
- AS ABOVE WITH ACTIVE PLACE AND HOLD FOR MP EXTENSION, ACTIVE IP MOV
- :WEEKS 3
- GRADED ACTIVE MOTION THUMB IP,MP,CMC,WRIST
- :WEEKS 5
- OPPOSITION

.FLEXOR TENOLYSIS REHAB

- EARLY AGGRESSIVE MOBILIZATION
- :WEEK 1
- AVOID BULKY DRESSING TO HELP MOVEMENT
- GENTLE PROM
- ACTIVE TENDON GLIDING EX(TENODISIS IF TENDON QUALITY POOR)
- ACTIVE EXTENSION EX
- :WEEK2-3
- AS BEFORE + BLOCKING EX FOR FDS, FDP
- FUNCTIONAL ACTIVITY
- :WEEK4-10
- GRIPPING EX, RESISTIVE ACTIVITY